Chirag Gupta, Ph.D.
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SUMMARY

Computational biologist with 4+ years of postdoctoral experience in research and analysis of multi-modal genomics data. Specifically, my research straddles between **regulatory genomics**, **network biology**, and **machine learning** with an aim to develop computationally tractable models of human diseases. I am currently working on projects focused on strategies to guide disease **biomarker discovery**, **drug repurposing**, and **patient stratification** using **multi-modal single-cell** genomic data of the **human brain**. I have extensive experience in written and oral communication to academics and business leaders through contributions to winning grants, 12+ peer reviewed publications, and several conference appearances.

EDUCATION

2017	**Ph.D. Computational Biology** (Cell and Molecular Biology) Dissertation: Transcriptome-based gene networks for systems-level analysis of gene function	**University of Arkansas,** Fayetteville, Arkansas, USA
2009	**M.Sc. Bioinformatics**	
2007	**B.Sc. Bioinformatics**	**Sardar Patel University**, India

RESEARCH EXPERIENCE

2021 – present	**Postdoctoral Research Associate** • PsychENCODE2, PsychAD • Single-cell genomics of the human brain • Network medicine	**University of Wisconsin**, Madison, Wisconsin, USA
2017 – 2020	**Postdoctoral Research Associate** • Plant and crop genomics • ML for gene prioritization in networks • Web-applications for network analysis	**University of Arkansas**, Fayetteville, Arkansas, USA
2012 – 2017	**Graduate Research Assistant** • Plant stress and developmental biology • Large-scale transcriptomics • Gene regulatory networks	
2008 — 2009	**Student Researcher** • Insilico analysis of fusion proteins in cancer • Protein structure prediction • Molecular modeling, drug designing	**Disha Life Sciences Pvt. Ltd.**, Gujarat, India

PUBLICATIONS

Under review/preprints

1. Yheni Dwiningsih, Julie Thomas, Anuj Kumar, **Chirag Gupta**, Navdeep Gill, Charles Ruiz, Jawaher Alkahtani, Niranjan Baisakh, Andy Pereira. Identification of QTLs and Candidate Loci Associated with Drought-Related Traits of the K/Z RIL Rice Population. (*preprint*)

2. **Chirag Gupta**, Arjun Krishnan, Andrew Schneider, Cynthia Denbow, Eva Collakova, Pawel Wolinski, Andy Pereira. SANe: The Seed Active Network for Discovering Transcriptional Regulatory Programs of Seed Development. (*preprint*)

Peer reviewed journal articles

1. **Chirag Gupta**, Jielin Xu, Ting Jin, Saniya Khullar, Xiaoyu Liu, Sayali Alatkar, Feixiong Cheng, Daifeng Wang. Single-cell network biology characterizes cell type gene regulation for drug repurposing and phenotype prediction in Alzheimer's disease. ***Plos Computational Biology,*** *July 2022. [full text] [cover story]*

2. **Chirag Gupta**, Pramod Chandrashekar, Chenfeng He, Ting Jin, Saniya Khullar, Qiang Chang, Daifeng Wang. Bringing machine learning to research on intellectual and developmental disabilities: taking inspiration from neurological diseases. ***Journal of Neurodevelopmental Disorders*** (IDDRC 2022 special issue on computational neuroscience), *May 2022. [full text]*

3. Anuj Kumar, **Chirag Gupta**, Julie Thomas, Andy Pereira. Genetic Dissection of Grain Yield Component Traits Under High Nighttime Temperature Stress in a Rice Diversity Panel. ***Frontiers in Plant Science****, September 2021. [full text]*

4. **Chirag Gupta**, Venkategowda Ramegowda, Supratim Basu, Andy Pereira. Using network-based machine learning to predict transcription factors involved in drought stress resistance. ***Frontiers in Genetics****, June 2021. [full text]*

5. Raksha Singh, Rohana Liyanage, **Chirag Gupta**, Jackson Lay Jr., Andy Pereira, Clemencia Rojas. The protein interactomes of AtNHR2A and AtNHR2B unraveled common and specialized functions in plant immunity integrating distinct biological processes. ***Frontiers in Plant Science****, March 2020. [full text]*

6. Min Woo Lee, Carmen S. Padilla, **Chirag Gupta**, Aravind Galla, Andy Pereira, Jiamei Li, Fiona L. Goggin. The FATTY ACID DESATURASE 2 family in tomato contributes to primary metabolism and stress responses. ***Plant Physiology****, Nov. 2019. [full text]*

7. **Chirag Gupta** and Andy Pereira. Recent advances in gene function prediction using context-specific coexpression networks in plants. ***F1000Research****, Feb. 2019. [full text]*

8. Arjun Krishnan, **Chirag Gupta**, Madana MR Ambavaram, Andy Pereira. RECoN: Rice Environment Co-expression Network for systems level analysis of abiotic-stress response. ***Frontiers in Plant Science****, Sep. 2017. [full text]*

9. Venkategowda Ramegowda, Upinder Singh Gill, Palaiyur Nanjappan Sivalingam, Aarti Gupta, **Chirag Gupta**, Geetha Govind, Karaba N Nataraja, Andy Pereira, Makarla

Udayakumar, Kirankumar S Mysore, Muthappa Senthil-Kumar. GBF3 transcription factor imparts drought tolerance in Arabidopsis thaliana. ***Scientific Reports**, August 2017. [full text]*

10. Venkategowda Ramegowda, Supratim Basu, **Chirag Gupta**, Andy Pereira. Regulation of grain yield in rice under well-watered and drought stress conditions by GUDK. ***Plant Signaling and Behavior**, January 2015. [full text]*

CONFERENCE PRESENTATIONS

Select talks

- Single-cell network biology characterizes cell type gene regulation for drug repurposing and phenotype prediction in Alzheimer's disease. **Alzheimer's Association International Conference,** San Diego, CA, 2nd August 2022
- Predicting rice genes important for drought tolerance using gene regulatory networks and machine learning. **Crops InSilico, 4th Annual Symposium and Hackathon**, Urbana, IL, 3rd May 2019
- Arabidopsis seed-filling association-network analysis. **American Society of Plant Biologists – Southern Section (ASPB-SS)**, Lexington, KY, 30th March 2014.

Select posters

- Single-cell network biology characterizes cell type gene regulation for drug repurposing and phenotype prediction in Alzheimer's disease, **Intelligent Systems for Molecular Biology**, Madison, WI, July 2022
- Network analysis of human brain cell types under Alzheimer's disease and healthy conditions, **Society of Neuroscience**, Chicago, IL, November 2021
- Network-based approach to prioritize lung cancer genes from whole-exome sequencing data. **Arkansas Bioinformatics Consortium**, Little Rock, AR, 25th March 2018
- [*Award winning poster*] An abiotic-stress conditioned gene regulatory network in rice predicted using an ensemble of reverse-engineering solutions. **The 25th Plant and Animal Genome (PAG) Conference**, San Diego, CA, 14th January 2017
- A resource for systems analysis of stress response in rice. **NSF Workshop on plant development and drought stress**, Monterey, CA, 8th November 2015
- In Silico Analysis of Fusion Proteins in Cancer, **International Conference on Biomedical and Genomic Research**, Ahmedabad, India, 30th January 2009

AWARDS

1. Crops in silico underrepresented minority travel scholarship, **Crops InSilico**, Urbana, IL, 2019
2. Scherago International Student Travel Grants Awards, **The 25th annual Plant and Animal Genome (PAG) meeting**, San Diego, CA, 2017
3. NSF Travel Grant to attend the Workshop on Plant Development and Drought Stress, **National Science Foundation**, 2015
4. Stood 3rd in merit list for all India entrance examination for Master's in bioinformatics program, **Sardar Patel University**, India, 2007
5. 2nd Prize in undergraduate oral presentation, **Sardar Patel University**, India, 2006
6. 3rd Prize in undergraduate poster competition, **Atmiya University**, India , 2006

GRANT CONTRIBUTIONS

- **NSF EPSCoR RII Track-2 FEC 1826836**: Systems genetics studies on rice genomes for analysis of grain yield and quality under heat stress (PI: Dr. Andy Pereira; $4,659,406), 2018
- **NSF MCB 1716844**: Systems genetics analysis of photosynthetic carbon metabolism in rice (PI: Dr. Andy Pereira; $798,725.00), 2017

SOCIETY MEMBERSHIPS

2019 - present	**The International Society for Computational Biology (ISCB)**
2022 - present	**The Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (ISTAART)**

SELECT SKILLS

Programming	R, Python, Perl
Bioinformatics	Extensive knowledge and experience with sequence data (NGS) processing pipelines (single-cell, bulk); quality control, variant calling, differential gene expression, gene-set enrichment analysis, network analysis
Data science	Machine learning (data cleaning, feature extraction, model training and evaluation); multi-modal data integration and analysis
Visualization	R, Shiny, Cytoscape
Platforms	Docker; Linux, MacOS; Google Cloud

TOOLS DEVELOPED

GRAiN	http://rrn.uark.edu/shiny/apps/GRAiN/
SANe	https://plantstress-pereira.uark.edu/SANe/
RECoN	https://plantstress-pereira.uark.edu/RECoN/

MENTORING EXEPRIENCE

Mentored a graduate student (Masters in Statistics, UW) and four undergraduate students under the University of Madison's Undergraduate Research Scholar contract for two semesters, 2021-2022. Project title: "Using network-based machine Learning to predict genes underlying neurological disorders"

TEACHING EXPERIENCE

Co-taught Plant Genomics (**Bioinformatics/Genomics modules**: CSES 5543, Uni. Of Arkansas), 2016, 2018

EXTENSION ACTIVITIES

Student and Teacher Workshop: rice genetic variation (18 credit hours, Uni. Of Arkansas), 2019

ACADEMIC SERVICE

- **External reviewer** for IEEE International Conference on Bioinformatics and Biomedicine (BIBM) 2022.

- **Specialty review editor** for Frontiers in Bioinformatics and Frontiers in Genetics
- **Manuscript reviewer** for Human Molecular Genetics, Journal of Neurodevelopmental Disorders, Plant Physiology, Frontiers in Plant Science, Nature Scientific Reports, Rice, Plant Cell Reports, Horticultural Plant Journal, Plant Methods, PLoS One, iMETA.
- **Plante Fellow 2019**: Contribution to the Plantae online portal for Bioinformatics resources relevant to plant biology research
- **Member of the panel of judges** for the Northwest Arkansas Regional Science and Engineering Fair 2015,16
- Conducted several training material and hands-on activities for undergraduates and K-12 students from the Arkansas agricultural areas in the Delta region for a **STEM literacy outreach program**

REFREES

Available upon request